

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

In re

INVENTOR:	T. Weiss et al.	)	EXAMINER:	B.K. Talbot
		)		
SERIAL NO.:	10/645,384	)	ART UNIT:	1762
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FILING DATE:	August 21, 2003	)	DATE:	June 11, 2007
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FOR:		)		

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**BRIEF FOR APPELLANTS**

This is an appeal from the final rejection by the Examiner mailed January 17, 2007, rejecting claims 1-23. A notice of appeal and the appeal fee were timely mailed on April 12, 2007. Please charge the fee of \$500.00 for the appeal brief fee (large entity) to the assignee's Deposit Account No. 09-0458.

### **REAL PARTY IN INTEREST**

The real party in interest is the assignee of all rights in this application, International Business Machines Corporation, a corporation of the State of New York, having a place of business at Armonk, New York.

### **RELATED APPEALS AND INTERFERENCES**

There are no appeals or interferences known to appellants, appellants' legal representatives or assignee, which will directly affect or be affected by, or have a bearing on the Board's decision on this appeal.

### **STATUS OF CLAIMS**

The subject application was filed on August 21, 2003 with claims 1-31. Appellants cancelled claims 24-31 in view of a restriction requirement. In an office action mailed January 17, 2007, a final rejection was made of all of the claims in the application, to wit, claims 1-23. Appellants are appealing the rejection of these claims.

### **STATUS OF AMENDMENTS**

Except for cancellation of claims 24-31, no amendments were made during prosecution of the application. The rejected claims 1-23 as they presently stand are set forth in the Appendix. A summary of the rejection of the claims may be found in the Final Office Action mailed January 17, 2007.

### **SUMMARY OF CLAIMED SUBJECT MATTER**

#### **I. Independent Claim 1**

Appellants' invention as defined in independent claim 1 is directed to a method of dispensing a flowable material (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) onto a workpiece (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13).

The method employs a dispensing apparatus (20, Fig. 1; specification p. 10, lines 1-2) comprising an orifice member (56, Figs. 1, 2, 3a-3f and 4; specification p. 10, lines 23-26) having first (58a, Figs. 3a, 3b and 4; specification p. 11, lines 24-28) and second surfaces (58b, Figs. 2, 3a, and 3d-3f; specification p. 11, lines 19-24) and a bore (64, Figs. 1, 3a-3f and 4; specification p. 10, lines 23-28) therethrough between the surfaces, a pressurized chamber (48, Figs. 1, 2 and 3a-3f; specification p. 10, lines 10-11 and 19-23) adjacent the orifice member first surface (58a, Figs. 3a, 3b and 4; specification p. 11, lines 24-28) for flowable material (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29), and a punch (60, Figs. 1-5; specification p. 10, lines 18-25) having a face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) movable through the orifice member bore (64, Figs. 1, 3a-3f and 4; specification p. 10, lines 23-28). A flowable material (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) is provided in the chamber (48, Figs. 1, 2 and 3a-3f; specification p. 10, lines 10-11 and 19-23).

The method includes positioning the punch (60, Figs. 1-5; specification p. 10, lines 18-25) outside the orifice member bore (64, Figs. 1, 3a-3f and 4; specification p. 10, lines 23-28) such that the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) is spaced from the orifice member first surface (58a, Figs. 3a, 3b and 4; specification p. 11, lines 24-28), and flowing a desired amount of flowable material (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) onto the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28). The method further includes moving the punch (60, Figs. 1-5; specification p. 10, lines 18-25) and desired amount of flowable material (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) on the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) through the orifice member bore until the punch face (62, Figs.

3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) extends beyond the orifice member second surface (58b, Figs. 2, 3a, and 3d-3f; specification p. 11, lines 19-24).

The method then includes contacting the workpiece (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13) with the desired amount of flowable material (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29 and page 12, lines 7-18) while still on the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28), and depositing the desired amount of flowable material (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29 and page 12, lines 7-18) onto the workpiece (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13). Finally, the method includes retracting the punch (60, Figs. 1-5; specification p. 10, lines 18-25) until the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28 and page 12, lines 18-21) is substantially coplanar with the orifice member second surface (58b, Figs. 2, 3a, and 3d-3f; specification p. 11, lines 19-24 and page 12, lines 18-21).

## **II. Independent Claim 20**

As defined in independent claim 20, appellants' invention is directed to a method of dispensing a conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) onto a ceramic greensheet (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13). The method employs a dispensing apparatus (20, Fig. 1; specification p. 10, lines 1-2) comprising an orifice member (56, Figs. 1, 2, 3a-3f and 4; specification p. 10, lines 23-26) having first (58a, Figs. 3a, 3b and 4; specification p. 11, lines 24-28) and second surfaces (58b, Figs. 2, 3a, and 3d-3f; specification p. 11, lines 19-24) and a bore (64, Figs. 1, 3a-3f and 4; specification p. 10, lines 23-28) therethrough between the surfaces, a chamber (48, Figs. 1, 2 and 3a-3f; specification p. 10, lines 10-11 and 19-23) adjacent the orifice member first surface (58a, Figs. 3a, 3b and 4; specification p. 11, lines 24-28) for conductive paste (70,

Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29), and a punch (60, Figs. 1-5; specification p. 10, lines 18-25) having a face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) movable through the orifice member bore (64, Figs. 1, 3a-3f and 4; specification p. 10, lines 23-28). A conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) is provided in the chamber (48, Figs. 1, 2 and 3a-3f; specification p. 10, lines 10-11 and 19-23).

The method includes positioning the punch (60, Figs. 1-5; specification p. 10, lines 18-25) outside the orifice member bore (64, Figs. 1, 3a-3f and 4; specification p. 10, lines 23-28) such that the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) is spaced from the orifice member first surface (58a, Figs. 3a, 3b and 4; specification p. 11, lines 24-28). The method further includes depositing a desired amount of conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) onto the greensheet (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13) by flowing a desired amount of conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) onto the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28). The method further includes moving the punch (60, Figs. 1-5; specification p. 10, lines 18-25) and desired amount of conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29) on the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) through the orifice member bore until the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and 24-28) extends beyond the orifice member second surface (58b, Figs. 2, 3a, and 3d-3f; specification p. 11, lines 19-24).

The method then includes contacting the ceramic greensheet (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13) with the desired amount of conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29 and page 12, lines 7-18) while still on the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and

24-28), and transferring the desired amount of conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29 and page 12, lines 7-18) onto the greensheet (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13) in the form of a dot (70, 70a, 70b, 70c, 70d, 70e, Figs. 3e, 3f, 5, 6 and 7; specification page 12, lines 11-15 and page 13, line 27 to page 14, line 8).

The method then includes depositing additional desired amounts of conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29 and page 12, lines 7-18) onto the greensheet (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13) in the form of dots (70, 70a, 70b, 70c, 70d, 70e, Figs. 3e, 3f, 5, 6 and 7; specification page 12, lines 11-15 and page 13, line 27 to page 14, line 8), calibrating size of the dots (70, 70a, 70b, 70c, 70d, 70e, Figs. 3e, 3f, 5, 6 and 7; specification page 12, lines 11-15 and page 13, line 27 to page 14, line 8) of conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29 and page 12, lines 7-18) applied onto the greensheet (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13) by measuring the size of the dots (70, 70a, 70b, 70c, 70d, 70e, Figs. 3e, 3f, 5, 6 and 7; specification page 12, lines 11-15, page 13, lines 8-13, and page 13, line 27 to page 14, line 8), and adjusting parameters for dispensing the conductive paste (70, Figs. 3c-3f, 4 and 7; specification p. 11, lines 26-29 and page 12, lines 7-18) onto the greensheet (30, Figs. 1, 3a-3f and 5-7; specification p. 10, lines 2-3 and page 12, lines 7-13) based on measurements of the size of the dots (70, 70a, 70b, 70c, 70d, 70e, Figs. 3e, 3f, 5, 6 and 7; specification page 12, lines 11-15 and page 13, line 27 to page 14, line 8). (See also steps 115-230, Fig. 8; specification page 16, line 7 to page 17, line 11.)

Finally, the method includes retracting the punch (60, Figs. 1-5; specification p. 10, lines 18-25) until the punch face (62, Figs. 3a, 3f and 4; specification p. 11, lines 10-12 and

24-28 and page 12, lines 18-21) is substantially coplanar with the orifice member second surface (58b, Figs. 2, 3a, and 3d-3f; specification p. 11, lines 19-24 and page 12, lines 18-21).

### **GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

The contested issues in this appeal are as follows:

Whether claims 1, 3-11 and 14-19 are obvious to one of ordinary skill in the art under 35 USC § 103 from Blette et al. U.S. Patent No. 5,186,982, and separately from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Whether claims 1, 3, 4, 6-11 and 14-19 are obvious to one of ordinary skill in the art under 35 USC § 103 from Brooks U.S. Patent No. 6,915,928.

Whether claim 2 is obvious to one of ordinary skill in the art under 35 USC § 103 from Blette et al., Brooks or Bryning et al. in combination with Bibeault et al. U.S. Patent No. 6,775,879.

Whether claims 12 and 13 are obvious to one of ordinary skill in the art under 35 USC § 103 from Blette et al., Brooks or Bryning et al. in combination with Banno et al. U.S. Patent No. 6,761,925 or Speakman U.S. Patent No. 6,503,831.

Whether claims 20, 22 and 23 are obvious to one of ordinary skill in the art under 35 USC § 103 from Blette et al., Brooks or Bryning et al. in combination with Hess et al. U.S. Patent Publication No. 2003/0119193.

Whether claim 21 is obvious to one of ordinary skill in the art under 35 USC § 103 from Blette et al., Brooks or Bryning et al. in combination with Hess et al. and further in combination with Bibeault et al.

## ARGUMENT

### I. Prior Art

#### Blette et al. U.S. Patent No. 5,186,982

Blette discloses a method for dispensing liquid materials such as small dots of solder paste. Unlike the present claimed method, Blette does not disclose an orifice member having first and second surfaces and a bore therethrough between the surfaces, or a pressurized chamber adjacent the orifice member first surface containing flowable material for flowing a desired amount of the flowable material onto the punch face. Instead, Blette has a conduit 38, intersecting passageway 16 at an intermediate point, through which the liquid material is directed onto the pin 22. Blette, column 3, lines 33-42 and Figs. 1 and 2. Blette has no "first surface" from which pin 22 is spaced for flowing flowable material onto the face of the pin.

#### Bryning et al. U.S. Patent Publication No. 2001/0009136

Bryning discloses a method for dispensing a small volume of liquid, such as biological sample or reagent. Bryning discloses no orifice member having first and second surfaces and a bore therethrough between the surfaces, or a pressurized chamber adjacent the orifice member first surface containing flowable material for flowing a desired amount of the flowable material onto the punch face. Instead, Bryning has a tube 14, having a larger upper diameter than its lower diameter, through which the liquid material is forced by fiber 12. Bryning has no "first surface" from which fiber 12 is spaced for flowing flowable material onto the face of the pin. Likewise, Bryning shows no such retracted position wherein the face of fiber 12 is coplanar with a "second surface" as in appellants' method.

#### Brooks. U.S. Patent No. 6,915,928

Brooks is directed to an electromagnetic method for dispensing liquids such as adhesives. Brooks discloses no orifice member having first and second surfaces and a bore

therethrough between the surfaces, or a pressurized chamber adjacent the orifice member first surface containing flowable material for flowing a desired amount of the flowable material onto the punch face. Instead, Brooks employs a conical dispensing tip 6 having an internal chamber for the adhesive with upwardly expanding diameter through which a pin 5 (Figs. 1 and 2) or 17 (Figs. 3-5) moves between a retracted position within the lower portion of the tip and an extended position outside the tip. Brooks has no "first surface" from which pin 5 or 17 is spaced for flowing flowable material onto the face of the pin. Likewise, Brooks shows no such retracted position wherein the face of pin 5 or 17 is coplanar with a "second surface" as in appellants' method.

Bibeault et al. U.S. Patent No. 6,775,879

Bibeault discloses a method for cleaning needles used in a liquid dispensing system. Bibeault positions the dispensing needle 26 over a cleaning orifice 70, and then activates an airflow to flow past the end of needle 26 to remove liquid residue. Bibeault does not disclose retracting the needle to a coplanar position, or cleaning the needle in such a position, as admitted by the Examiner (Final Office Action, p.8).

Banno et al. U.S. Patent No. 6,761,925

Banno discloses a method for producing an electron emitting device such as an ink jet ejecting device. Banno does not disclose applying a conductive paste to a ceramic greensheet.

Speakman U.S. Patent No. 6,503,831

Speakman discloses the formation of an electronic device using drop on demand printing such as with ink jets. Speakman does not disclose applying a conductive paste to a ceramic greensheet.

Hess et al. U.S. Patent Publication No. 2003/0119193

Hess discloses a method of screening fluid samples. Hess states in paragraph 0112 "a controller having feedback control may be used to recalibrate the dispenser. The size of the droplet dispensed, or another characteristic of the droplet, is measured and parameters of the dispenser can be adjusted accordingly."

## **II. The Examiner's Rejections and Appellants' Arguments as to Non-Obviousness**

### **A. Claims 1, 3, 4, 6, 7, 8, 10 and 17**

Claims 1, 3, 4, 6, 7, 8, 10 and 17 stand rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

As recited in claim 1, the instant method initially provides a dispensing apparatus comprising an orifice member having first and second surfaces and a bore therethrough between the surfaces, a pressurized chamber adjacent the orifice member first surface for flowable material, and a punch having a face movable through the orifice member bore. The method then includes positioning the punch outside the orifice member bore such that the punch face is spaced from the orifice member first surface and flowing a desired amount of flowable material onto the punch face from the chamber. After depositing the desired amount of flowable material onto the workpiece, the punch is retracted until the punch face is substantially coplanar with the orifice member second surface.

### **The rejection under Blette et al. U.S. Patent No. 5,186,982**

Unlike the present claimed method, Blette does not disclose an orifice member having first and second surfaces and a bore therethrough between the surfaces, or a pressurized chamber adjacent the orifice member first surface containing flowable material for flowing a desired amount of the flowable material onto the punch face. Instead, Blette has a conduit

38, intersecting passageway 16 at an intermediate point, through which the liquid material is directed onto the pin 22. Blette, column 3, lines 33-42 and Figs. 1 and 2. Blette has no "first surface" from which pin 22 is spaced for flowing flowable material onto the face of the pin.

Furthermore, after depositing the flowable material, appellants' method retracts the punch until the punch face is substantially coplanar with the orifice member second surface. Blette shows no such retracted position wherein the face of pin 22 is coplanar with a "second surface" as in appellants' method.

The Examiner has acknowledged that Blette fails to teach retracting a pin or punch "until the punch face is substantially coplanar with the orifice member second surface" as recited in claim 1. However, the Examiner dismisses this step as "a matter of design choice by one practicing in the art." Final Office Action, p.8. Notwithstanding the Examiner's dismissal of this limitation, the present invention is directed in part to solving the problem of clogged nozzles in a method for dispensing conductive paste. *See*, specification, page 2, lines 6-8. As stated in the specification, this problem is solved by the claimed method of retracting the punch face to be coplanar with the orifice member second surface:

When sitting idle the punch is positioned such that the tip of the punch is flush with the bottom of the orifice. This allows the orifice and punch tip to be wiped clean of any residual paste and also seals the paste chamber to prevent premature drying of the paste.

Specification, page 9, lines 25-28. There is simply no disclosure or suggestion in Blette of retracting the punch face in this manner to provide the significant and unexpected advantages achieved by appellants' claimed method.

The rejection under Bryning et al. U.S. Patent Publication No. 2001/0009136

Bryning discloses a method for dispensing a small volume of liquid, such as biological sample or reagent. As with Blette, Bryning discloses no orifice member having first and second surfaces and a bore therethrough between the surfaces, or a pressurized chamber adjacent the orifice member first surface containing flowable material for flowing a desired amount of the flowable material onto the punch face. Instead, Bryning has a tube 14, having a larger upper diameter than its lower diameter, through which the liquid material is forced by fiber 12. Bryning has no "first surface" from which fiber 12 is spaced for flowing flowable material onto the face of the pin.

Likewise, Bryning shows no such retracted position wherein the face of fiber 12 is coplanar with a "second surface" as in appellants' method. While the Examiner also takes the position that this coplanar retraction is a mere "design choice," (Final Office Action, p.8), the appellants have presented the instant invention as directed in part to solving the problem of clogged nozzles, and have expressly stated the advantage that "[i]n this position any residual paste may be cleaned from the punch face and orifice surface 58b by wiping or spraying with a cleaner." Specification, page 12, lines 21-22. Bryning suggests no such retraction step advantage nor any advantage of doing so.

The rejection under Brooks et al. U.S. Patent No. 6,915,928

Brooks is directed to an electromagnetic method for dispensing liquids such as adhesives. Brooks, like the previous references discussed above, discloses no orifice member having first and second surfaces and a bore therethrough between the surfaces, or a pressurized chamber adjacent the orifice member first surface containing flowable material for flowing a desired amount of the flowable material onto the punch face. Unlike appellants' method, Brooks employs a conical dispensing tip 6 having an internal chamber for the

adhesive with upwardly expanding diameter through which a pin 5 (Figs. 1 and 2) or 17 (Figs. 3-5) moves between a retracted position within the lower portion of the tip and an extended position outside the tip. Brooks has no "first surface" from which pin 5 or 17 is spaced for flowing flowable material onto the face of the pin. Likewise, Brooks shows no such retracted position wherein the face of pin 5 or 17 is coplanar with a "second surface" as in appellants' method. Again, the Examiner states that this step of retracting the punch face to be substantially coplanar with the orifice member second surface is but a "design choice" (Final Office Action, p.8), yet can point to no suggestion in Brooks of a method that "reduces the problems of clogged nozzles in dispensing conductive paste onto a greensheet" as the present invention does. Specification, page 20, lines 8-9.

B. Claim 2

Claim 2 stands rejected under 35 USC § 103 as being obvious from Blette et al., Brooks or Bryning et al. in combination with Bibeault et al. U.S. Patent No. 6,775,879.

Claim 2 adds to the method of claim 1 the step of cleaning the punch face and coplanar orifice member second surface to remove any residual flowable material thereon, after the punch face is retracted to be substantially coplanar with the orifice member second surface.

The Examiner has admitted that Blette, Brooks and Bryning "fail to teach cleaning the pin to remove residual coating material." Final Office Action, p.5. However, Bibeault does not disclose the cleaning method or punch position as recited in claim 2. Bibeault positions the dispensing needle 26 over a cleaning orifice 70, and then activates an airflow to flow past the end of needle 26 to remove liquid residue. Bibeault does not disclose cleaning a punch face while the punch face is retracted to be substantially coplanar with the orifice member second surface.

While the failure of Bibeault to disclose cleaning a punch face while it is retracted in the coplanar position is in fact admitted by the Examiner (Final Office Action, p.8), the Examiner takes the position:

[O]ne skilled in the art would be suggested to clean the pin/punch after deposition and prior to retracting within the orifice so as to prevent clogging. Hence, the cleaning would be done either outside of the coplanar state or at the coplanar state. It is the Examiner's position that this combination would suggest to one skilled in the art to either position with that expectation of achieving similar success."

Final Office Action, pp.8-9. However, Bibealt fails to teach retracting to a coplanar position at all. Consequently, any suggestion to do so, and then to clean the punch face only after it is in this coplanar position comes from a reading of appellants' own specification. This amounts to impermissible hindsight, and not from any suggestion in Bibeault or to one of ordinary skill in the art. As such, appellants' claim 2 is not obvious from the combination of the primary references with Bibeault et al. U.S. Patent No. 6,775,879.

C. Claim 5

Claim 5 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982 and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 5, dependent on claim 1 adds the additional limitation of sealing the bore and chamber when the punch face is retracted to be coplanar with the second surface. Neither Blette nor Bryning discloses such feature.

D. Claim 9

Claim 9 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 9, dependent on claim 1 adds the additional limitation of the deposit of conductive, adhesive paste on a ceramic greensheet. Neither Blette nor Brooks nor Bryning discloses such feature.

E. Claim 11

Claim 11 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 11, dependent on claim 1 adds the additional limitation of the repeated depositing of flowable material onto a previously deposited amount of flowable material to create a desired height of flowable material on the workpiece. Neither Blette nor Brooks nor Bryning discloses such feature.

F. Claims 12 and 13

Claims 12 and 13 stand rejected under 35 USC § 103 as being obvious from Blette et al., Brooks or Bryning et al. in combination with Banno et al. U.S. Patent No. 6,761,925 or Speakman U.S. Patent No. 6,503,831.

Both claims 12 and 13 specify that the flowable material is a conductive paste and the workpiece is a ceramic greensheet. However, neither Banno nor Speakman teach applying a conductive paste to a ceramic greensheet, and therefore cannot render obvious the method of appellants' claims 12 and 13.

G. Claim 14

Claim 14 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 14, dependent on claim 1 adds the additional limitation of repeating the depositing of the flowable material and simultaneously adjusting the spacing of the punch face from the orifice member first surface to adjust the desired amount of flowable material on the punch face. Although the Examiner takes the position that a "controlling mechanism" is taught in Blette, Brooks and Bryning (Final Office Action, p.4), the particular limitations of claim 14 is not disclosed or suggested in Blette , Brooks or Bryning.

H. Claim 15

Claim 15 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 15, dependent on claim 1 adds the additional limitation of adjusting the distance the punch face extends beyond the orifice member second surface to adjust the diameter of the desired amount of flowable material deposited onto the workpiece. Although the Examiner takes the position that a "controlling mechanism" is taught in Blette, Brooks and Bryning (Final Office Action, p.4), the particular limitations of claim 15 is not disclosed or suggested in Blette, Brooks or Bryning.

I. Claim 16

Claim 16 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 16, dependent on claim 1 adds the additional limitation of simultaneously measuring size of the flowable material deposited onto the workpiece and using the size measurement to adjust the distance the punch face extends beyond the orifice member second surface and the size of the desired amount of flowable material deposited onto the workpiece. Although the Examiner takes the position that a "controlling mechanism" is taught in Blette, Brooks and Bryning (Final Office Action, p.4), the particular limitations of claim 16 is not disclosed or suggested in Blette, Brooks or Bryning.

J. Claim 18

Claim 18 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 18, dependent on claim 1 adds the additional limitation of repeatedly moving the punch from a position outside the orifice member bore, where the punch face is spaced from the orifice member first surface, through the orifice member bore to a position where the punch face is substantially coplanar with the orifice member second surface, prior to extending the punch face beyond the orifice member second surface and depositing the desired amount of flowable material onto the workpiece. Neither Blette nor Brooks nor Bryning discloses such feature.

K. Claim 19

Claim 19 stands rejected under 35 USC § 103 as being obvious separately from Blette et al. U.S. Patent No. 5,186,982, from Brooks U.S. Patent No. 6,915,928, and from Bryning et al. U.S. Patent Publication No. 2001/0009136.

Claim 19, dependent on claim 1 adds the additional limitation of measuring the distance of the workpiece to the orifice member second surface and, using the distance

measurement, adjusting the distance the punch face extends beyond the orifice member second surface and the diameter of the desired amount of flowable material deposited onto the workpiece. Although the Examiner takes the position that a "controlling mechanism" is taught in Blette, Brooks and Bryning (Final Office Action, p.4), the particular limitations of claim 19 is not disclosed or suggested in Blette, Brooks or Bryning.

L. Claim 20

Claim 20 stands rejected under 35 USC § 103 as being obvious from Blette et al., Brooks or Bryning et al. in combination with Hess et al. U.S. Patent Publication No. 2003/0119193.

Claim 20 is directed to a method of dispensing a conductive paste onto a ceramic greensheet comprising initially providing dispensing apparatus of the same type as recited in claim 1. In a manner analogous to that of claim 1, the method requires positioning the punch outside the orifice member bore such that the punch face is spaced from the orifice member first surface and flowing a desired amount of conductive paste onto the punch face from the chamber. The method of claim 20 further includes depositing additional desired amounts of conductive paste onto the greensheet in the form of dots, calibrating size of the dots of conductive paste applied onto the greensheet by measuring the size of the dots, adjusting parameters for dispensing the conductive paste onto the greensheet based on measurements of the size of the dots, and retracting the punch until the punch face is substantially coplanar with the orifice member second surface.

As discussed above in connection with claim 1, neither Blette, Brooks nor Bryning disclose any orifice member having first and second surfaces and a bore therethrough between the surfaces, a pressurized chamber adjacent the orifice member first surface containing conductive paste for flowing a desired amount of the paste onto the punch face

when it is positioned outside the orifice member bore such that the punch face is spaced from the orifice member first surface, or a retracted position wherein the punch face is substantially coplanar with the second surface of the orifice member. Hess likewise lacks the disclosure of such limitations of claim 20. These deficiencies alone prevent the combination of Blette, Brooks, Bryning and Hess from establishing *prima facie* obviousness of claim 20.

The Examiner acknowledges that Blette, Brooks and Bryning "fail to teach a calibrating step of measuring the size of the droplets" (Final Office Action, p.6.), but cites Hess for such disclosure. Appellants respectfully disagree that the hypothetical combination renders the invention of claim 20 obvious.

Hess states in paragraph 0112 "a controller having feedback control may be used to recalibrate the dispenser. The size of the droplet dispensed, or another characteristic of the droplet, is measured and parameters of the dispenser can be adjusted accordingly." However, as described in appellants' specification and drawings, the appellant may use the distance that the punch face is spaced from the orifice member first surface in order to provide different amounts of conductive paste on the punch face for deposition. *See* Specification, page 12, lines 23-25 and page 13, lines 8-19 and Fig. 4. Since the Blette, Brooks, Bryning and Hess references lack such disclosure or suggestion, claim 20 is not obvious from these references.

M. Claim 21

Claim 21 stands rejected under 35 USC § 103 as being obvious from Blette et al., Brooks or Bryning et al. in combination with Hess et al. and further in combination with Bibeault et al.

Claim 21, is dependent on claim 20, and recites the same subject matter as contained in claim 2, i.e., after the punch face is substantially coplanar with the orifice member second surface, further including cleaning the punch face and coplanar orifice member second surface to remove any residual flowable material thereon.

The Examiner again admits that Blette, Brooks, Bryning and Hess "fail to teach cleaning the pin to remove residual coating material." Final Office Action, p.7. For the same reasons given above in connection with claim 2, appellants submit that Bibeault does not disclose the cleaning method or punch position as recited in claim 20.

N. Claim 22

Claim 22 stands rejected under 35 USC § 103 as being obvious from Blette et al., Brooks or Bryning et al. in combination with Hess et al. U.S. Patent Publication No. 2003/0119193.

Claim 22, dependent on claim 20, recites that calibration of size of the dots of conductive paste includes determining rate of change of the size of the dots on the greensheet, determining average size of the dots on the greensheet, and determining difference in size between dots on the greensheet, that the adjustment of parameters for dispensing the conductive paste onto the greensheet is based on one or more of the determinations of rate of change of the size of the dots, average size of the dots and difference in size between smallest and largest dots on the greensheet.

The Hess disclosure of feedback control is based on "the size of the droplet dispensed, or another characteristic of the droplet." Hess, p.9, para. 0112. Hess does not disclose or suggest any calibration based on dynamic comparison of measurements of a plurality of droplets, such as the determinations of rate of change of the size of the dots, average size of the dots and difference in size between smallest and largest dots on the

workpiece surface as recited in claim 22. The Examiner states only that he "disagrees" and that Hess "teaches a feedback control loop with calibration of the droplets." Final Office Action, p.9. However, the Examiner fails to cite in Hess any disclosure or suggestion of the specific determinations of rate of change of the size of the dots, average size of the dots or difference in size between smallest and largest dots on the greensheet, to calibrate the size of the dots. Therefore, Hess cannot render claim 22 obvious to one of ordinary skill in the art.

O. Claim 23

Claim 23 stands rejected under 35 USC § 103 as being obvious from Blette et al., Brooks or Bryning et al. in combination with Hess et al. U.S. Patent Publication No. 2003/0119193.

Claim 23, dependent on claim 22, further recites assigning a calibration score based on the determinations of rate of change of the size of the dots, average size of the dots and difference in size between smallest and largest dots on the workpiece surface.

The Hess disclosure of feedback control is based on "the size of the droplet dispensed, or another characteristic of the droplet." Hess, p.9, para. 0112. Hess does not disclose or suggest any calibration score based on the determinations of rate of change of the size of the dots, average size of the dots and difference in size between smallest and largest dots on the workpiece surface as recited in claim 23. The Examiner states only that he "disagrees" and that Hess "teaches a feedback control loop with calibration of the droplets." Final Office Action, p.9. However, the Examiner fails to cite in Hess any disclosure or suggestion of the specific determinations of calibration score based on the determinations of rate of change of the size of the dots, average size of the dots and difference in size between smallest and largest dots on the workpiece surface. Therefore, Hess cannot render claim 23 obvious to one of ordinary skill in the art.

**CONCLUSION**

For the reasons given above, appellants submit that claims 1-23 of the instant application are not obvious from the cited prior art. Reversal of the rejections under 35 USC § 103 is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Peter W. Peterson', written over a horizontal line.

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**CLAIMS APPENDIX****Rejected Claims of Serial No. 10/645,384**

1. (original) A method of dispensing a flowable material onto a workpiece comprising:  
providing a dispensing apparatus comprising an orifice member having first and second surfaces and a bore therethrough between the surfaces, a pressurized chamber adjacent the orifice member first surface for flowable material, and a punch having a face movable through the orifice member bore;  
providing a flowable material in the chamber;  
positioning the punch outside the orifice member bore such that the punch face is spaced from the orifice member first surface;  
flowing a desired amount of flowable material onto the punch face;  
moving the punch and desired amount of flowable material on the punch face through the orifice member bore until the punch face extends beyond the orifice member second surface;  
contacting the workpiece with the desired amount of flowable material while still on the punch face;  
depositing the desired amount of flowable material onto the workpiece; and  
retracting the punch until the punch face is substantially coplanar with the orifice member second surface.
2. (original) The method of claim 1 wherein, after the punch face is substantially coplanar with the orifice member second surface, further including cleaning the punch face

and coplanar orifice member second surface to remove any residual flowable material thereon.

3. (original) The method of claim 1 wherein the chamber has larger diameter than the orifice member bore.

4. (original) The method of claim 1 wherein the orifice member lower surface does not contact the workpiece.

5. (original) The method of claim 1 wherein the punch creates a sliding seal fit inside the orifice member bore and wherein the step of retracting the punch until the punch face is substantially coplanar with the orifice member second surface simultaneously seals the bore and chamber.

6. (original) The method of claim 1 wherein the orifice member bore diameter is less than 72  $\mu\text{m}$ .

7. (original) The method of claim 1 wherein the flowable material is deposited with a diameter less than 50 $\mu\text{m}$ .

8. (original) The method of claim 1 wherein less than 50 picolitres of the flowable material is deposited on the workpiece.

9. (original) The method of claim 1 wherein the flowable material is a conductive, adhesive paste and the workpiece is a ceramic greensheet.
10. (original) The method of claim 1 further including continuously repeating the depositing of the desired amount of flowable material onto the workpiece a plurality of times.
11. (original) The method of claim 1 further including repeating the depositing of the desired amount of flowable material onto a previously deposited amount of flowable material to create a desired height of flowable material on the workpiece.
12. (original) The method of claim 1 wherein the flowable material is a conductive paste and the workpiece is a ceramic greensheet having a via opening therein, and including depositing of the desired amount of flowable conductive paste into the via opening.
13. (original) The method of claim 1 wherein the flowable material is a conductive paste and the workpiece is a ceramic greensheet, and including repeatedly depositing desired amounts of flowable conductive paste adjacent previously deposited amounts of flowable material to create a line of conductive paste on the ceramic greensheet.
14. (original) The method of claim 1 including continuously repeating the flowing of the flowable material onto the punch face and the depositing of the flowable material onto the workpiece, and further including simultaneously adjusting the spacing of the punch face

from the orifice member first surface to adjust the desired amount of flowable material on the punch face.

15. (original) The method of claim 1 including continuously repeating the flowing of the flowable material onto the punch face and the depositing of the flowable material onto the workpiece, and further including simultaneously adjusting the distance the punch face extends beyond the orifice member second surface to adjust the diameter of the desired amount of flowable material deposited onto the workpiece.

16. (original) The method of claim 1 including continuously repeating the flowing of the flowable material onto the punch face and the depositing of the flowable material onto the workpiece, and further including simultaneously measuring size of the flowable material deposited onto the workpiece and using the size measurement to adjust the distance the punch face extends beyond the orifice member second surface and the size of the desired amount of flowable material deposited onto the workpiece.

17. (original) The method of claim 1 further including pressurizing the flowable material in the chamber to flow the desired amount of flowable material onto the punch face, without forcing the flowable material out through the orifice member bore, when the punch is positioned outside the orifice member bore and the punch face is spaced from the orifice member first surface.

18. (original) The method of claim 1 including, prior to extending the punch face beyond the orifice member second surface and depositing the desired amount of flowable

material onto the workpiece, repeatedly moving the punch from a position outside the orifice member bore, where the punch face is spaced from the orifice member first surface, through the orifice member bore to a position where the punch face is substantially coplanar with the orifice member second surface.

19. (original) The method of claim 1 further including measuring the distance of the workpiece to the orifice member second surface and, using the distance measurement, adjusting the distance the punch face extends beyond the orifice member second surface and the diameter of the desired amount of flowable material deposited onto the workpiece.

20. (original) A method of dispensing a conductive paste onto a ceramic greensheet comprising:

providing a dispensing apparatus comprising an orifice member having first and second surfaces and a bore therethrough between the surfaces, a chamber adjacent the orifice member first surface for conductive paste, and a punch having a face movable through the orifice member bore;

providing conductive paste in the chamber;

positioning the punch outside the orifice member bore such that the punch face is spaced from the orifice member first surface;

depositing the desired amount of conductive paste onto the greensheet by flowing a desired amount of conductive paste onto the punch face, moving the punch and desired amount of conductive paste on the punch face through the orifice member bore until the punch face extends beyond the orifice member second surface, contacting the greensheet with the desired amount of conductive paste while still on

the punch face, and transferring the desired amount of conductive paste onto the greensheet in the form of a dot;

depositing additional desired amounts of conductive paste onto the greensheet in the form of dots;

calibrating size of the dots of conductive paste applied onto the greensheet by measuring the size of the dots;

adjusting parameters for dispensing the conductive paste onto the greensheet based on measurements of the size of the dots; and

retracting the punch until the punch face is substantially coplanar with the orifice member second surface.

21. (original) The method of claim 20 wherein, after the punch face is substantially coplanar with the orifice member second surface, further including cleaning the punch face and coplanar orifice member second surface to remove any residual flowable material thereon.

22. (original) The method of claim 20 wherein calibrating size of the dots of conductive paste further includes determining rate of change of the size of the dots on the greensheet, determining average size of the dots on the greensheet, and determining difference in size between dots on the greensheet; and wherein adjusting parameters for dispensing the conductive paste onto the greensheet based on one or more of the determinations of rate of change of the size of the dots, average size of the dots and difference in size between smallest and largest dots on the greensheet.

23. (original) The method of claim 22 further including assigning a calibration score based on the determinations of rate of change of the size of the dots, average size of the dots and difference in size between smallest and largest dots on the workpiece surface.

24-31. (cancelled)

**EVIDENCE APPENDIX**

None

**RELATED PROCEEDINGS APPENDIX**

None